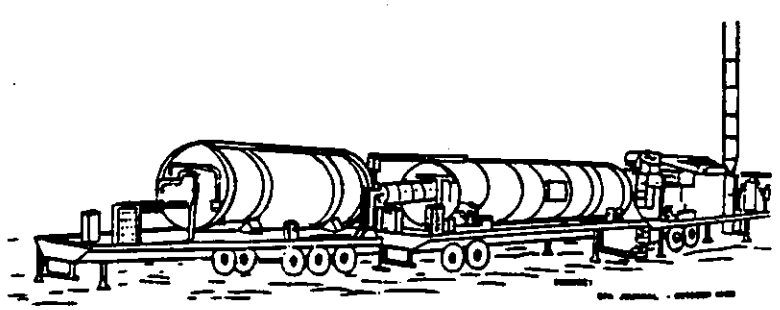
ONTARIO MINISTRY OF THE ENVIRONMENT

CWML PCB STORAGE FACILITY
SMITHVILLE ONTARIO

A Progress Report on Preliminary Evaluation of Contractor Responses for the Destruction of PCBs and Facility Decommissioning



Waste Management Branch (MOE)
The Proctor & Redfern Group

SEPT, 1986

(Sept 16)

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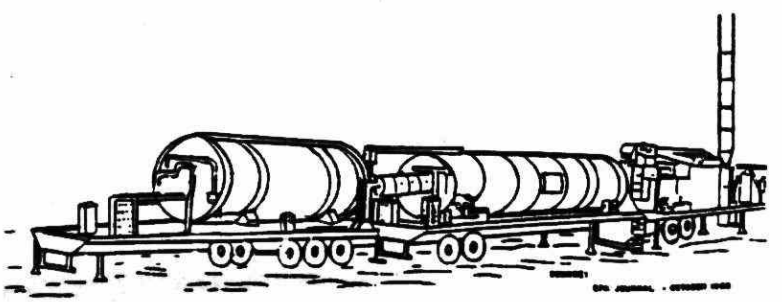

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REVIEW AND EVALUATION OF RESPONSES TO REQUEST FOR PRELIMINARY SUBMISSION

"THE DESTRUCTION OF PCBS STORED AT THE CWML SITE IN SMITHVILLE (TOWNSHIP OF WEST LINCOLN) AND THE DECOMMISSIONING OF THE STORAGE FACILITY"

A PROGRESS REPORT

Waste Management Branch
Ministry of the Environment
40 St. Clair Avenue West
Toronto

Proctor & Redfern Limited
Consulting Engineers and Planners
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EO 86628-3

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INTRODUCTION

The Ministry of the Environment (MOE) is establishing the next step in its undertaking to the Township of West Lincoln and its citizens to clean up the PCBs present on the Chemical Waste Management Limited (CWML) site in the Township of West Lincoln (Smithville Industrial Park); that is to safely and thoroughly decommission this site, a former transfer station for PCB contaminated material. A summary of the on-site waste inventory is attached as Appendix "A".

This Progress Report provides a review and evaluation of various commercial proposals presented by technology contractors who are potential candidates for consideration as on-site operators of mobile destruction facilities to deal with disposition of the diverse PCB waste materials at present existing on the Smithville, Ontario, PCB waste site.

In general, this Progress Report addresses the contractors' responses as they relate to:

- o meeting Ontario's regulatory requirements
- o responsiveness to the MOE request
- o applicability of the technology to the situation at the CWML site
- o capability of the contractor to effect the cleanup of all the diverse forms of PCB wastes in a timely fashion
- o effecting total decommissioning and clean up of the site

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- carrying out the work within the physical constraints of the CWML property.

A Request for Preliminary Submissions was issued by MOE on April 14, 1986, comprising a package of information:

1) Details document including:

   - Technology and site approvals
   - Demonstration testing
   - Operational controls
   - Ontario Regulation 148/86

2) Ontario Regulation 11/82

3) Guidance Manual for evaluating applications for approval of mobile PCB destruction technologies

4) An excerpt from the preliminary hearing document "Use and Distribution of In-Service PCBs and PCB Wastes in Ontario"

This substantial package was sent to 27 potential candidate companies in Canada and the United States, as shown on the attached list, Appendix "B".

Responses were received from eight companies on this list within the original deadline of May 31, 1986. Subsequently, one response was received and accepted from a company not originally on the circulation list.

Proctor & Redfern Limited (P&R) a consulting engineering company currently engaged to assist MOE in the first steps of site cleanup, was requested on June 26th, 1986 to review the proposals received. This report is a joint effort of the MOE review team and P&R.

In order for the reader to understand the context of the potential PCB destructor's assignment, an overview of current activity on site as it relates to work to be accomplished by the selected proponent(s) is provided on the following three pages.

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BACKGROUND

Current Activity

Current cleanup activity on the CWML site is listed below:

- Some new site works have been installed to permit cleanup/destruction facilities to operate, including total site fencing, a concrete cleanup pad, water treatment system, site office trailer (equipped with a supply of safety clothes, showers and other facilities). The site trailer has been supplied by P&R, the fence by Jim Kaiser Ltd. and the concrete truck cleaning pad and site sewer services by Wm. Groves of Hamilton and other local contractors. Sanexen has supplied and will operate the water treatment facility.

- All equipment (electric capacitors, transformers) - tanks - buildings - trucks etc. are being cleaned, dismantled and the cleaned metal will be removed for smelter furnace recovery and the remaining PCB contaminated liquid, metal parts, sludges in drums, contaminated cleaning solvents, etc. temporarily stored in drums on pallets or in special containers outside the original small fenced compound. This work is being undertaken by Sanexen International Inc. - a company located in Burlington, Ontario.

- Temporary concrete and steel buildings are being erected on the CWML site to permit safe storage of the palletized or boxed material noted above, and some 40,000 Imperial gallons of askarel type PCB (26%) transferred to new steel storage tanks fitted with glycol vent filtering devices. This work is being undertaken by Edland Construction of Grimsby.

- After the buildings are completed, all cleaned drums, boxes etc. will be moved by a contractor (yet to be named) into the buildings. PCB liquids will have been transferred to the new storage tanks as part of the Sanexen cleanup project.

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- P&R (with Beak Analytical Services) are now sampling and preparing an inventory of all material contained in drums which are currently closed. With the assistance of Gartner Lee Associates and Zenon Environmental Inc., another laboratory contractor, P&R will have determined the extent, characteristics and volume of the PCB contaminated soil (above 20 ppm[1]) within the compound and in the drainage pathways leading from the CWML site. Gartner Lee will have measured and assessed the rate of migration of the PCB contaminant plume.

  All of the above will result in a more accurate inventory/assessment of the extent of PCB contaminant associated with askarel, equipment, drummed material, cleaning solvents, boxed material, including miscellaneous items such as timber, small tools, soiled clothing, etc.

- P&R, with MOE, will be able to recommend the best plan to deal with the second phase of the cleaning (as opposed to destruction) activity. Two possibilities appear at this time:

  1. If migration of the PCB plume in the soil is not occurring or is occurring at a slow enough pace so as to provide time to deal with it in say two to three years, the PCB contaminated soil will be left in situ, possibly protected by a surface membrane of asphalt or geomembrane to minimize further hydraulic induced downward and outward plume migration and surface erosion due to run-off water, wind, tracking by equipment and/or people.

  2. If migration of the plume is such that the groundwater resource is affected now or threatened in a short period of time, say within five years, the PCB contaminated soil will be excavated and all soil

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The intent, in the "contaminated soil stage" of the work, is to clean the site and the externally affected land of all traces of PCB above the background level.

When the selected PCB destruction contractor arrives on the CWML site, the following describes what will probably be in place:

1. Two new temporary storage buildings.

2. All liquid askarel PCB in the new tanks located within one of the storage buildings.

3. A completely inventoried, quantified and qualified array of barrels, boxes, and tanks of PCB contaminated sludges, wood, miscellaneous articles, solvents, askarel, transformer and condenser cores (etc.) placed on storage racks or on the floor of the other (larger) storage building.

4. Contaminated soil in a containment facility and in piles or, in situ under protective membrane.

5. Site facilities, such as fences, office trailers, water, sewer and electrical power connections, a concrete equipment cleaning pad with sumps etc. The water treatment facility will have been taken down and removed by Sanexen.

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OBJECTIVE OF THIS REVIEW

The primary objective of this review will be to establish a short list of contractors who will be invited to present detailed proposals for the provision and operation of mobile PCB destruction facilities to deal with all of the PCB wastes at Smithville as summarized above.

RESPONDENTS - NINE IN ALL

Submissions were received in response to the MOE request from the following organizations and joint ventures:

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RESPONDENTS

1.	Westinghouse Plasma Systems Canada Inc. JV of Pyrolysis Systems Canada Inc. and Westinghouse Corporation Michael J. Joseph Niagara Falls, Ontario	**Westinghouse***
2.	Chemical Decontamination Corporation US Operator only Charles H. Roche Birdsboro, PA	**CDC**
3.	ELI EcoLogic Inc. Douglas J. Hallett Acton, Ontario	**Eco Logic**
4.	Ensco Division of Environmental Systems Company operating in Canada through New Energy of Canada John H. Lanier Little Rock, AR. (Ensco) Donald Manson Toronto, Ontario (New Energy)	**Ensco**
5.	Lummus Canada Inc. including C.E. Raymond (equipment) Tricil Ltd. (as operators) J.V. Dillewyn (Lummus) Willowdale, Ontario	**Lummus**
6.	PPM Canada Inc. Sub of PPM Inc.(US) now owned by USPCI, Inc. Oklahoma City, OK. David Alaniz Toronto, Ontario	**PPM**
7.	Unison Transformer Services Inc. Sub. of Union Carbide Corporation S.C. Vick Tarrytown, N.J.	**Unison TS**
8.	Voltec Industries Limited Licencee of Ecolaire ECP Charlotte, N.C. Larry R. Loven Spruce Grove, Alta.	**Voltec**

Later:

9.	Chatwood Resources Ltd. US source technology Vancouver new business Martin Torban, Vancouver B.C.	**Chatwood**

* for convenience, respondents are referred to by the short name listed opposite the full company name.

APPROACH - WHAT FEATURES ARE MOST IMPORTANT?

The review, which follows, was carried out considering:

- technology factors - the type of process, its capability to take liquid/solids/sludges/soils, its maturity, its efficiency, and its capacity

- project oriented factors - costs, schedule, ability to function in the Smithville space constraints, utilities requirements

- ability to meet various regulatory constraints

- company factors - structure, resources, maturity, financing

In particular, attention was given to the seven factors outlined in the MOE request as performance criteria for the suitability of the equipment and expertise capable of carrying out the complete project.

1) they must be mobile, i.e. will be moved off the site after less than nine months (from first day of site entry to the day of departure).

2) they must be able to be sited on the CWML property in compliance with Ontario requirements

3) they must have the capacity to destroy askarels and achieve a destruction efficiency of at least 99.9999%

4) they must be able to destroy the PCB's in all liquids (non-askarel) stored on the site

5) they must be able to decontaminate soils within the compound

6) they must be able to decontaminate the PCB contaminated equipment stored on the site

7) they must have the expertise and experience necessary to destroy the various PCB wastes of the site and to decommission the compound

DISCUSSION

Information extracted from the review of the various responses is summarized in the matrix tabulation which follows as Table 1.

Technology (as described by Proponent):

In addition, a general review of the technologies and the details of each derived from a review of the data provided follows on Table 2.

Of the **nine** responses, **five** proposed **high temperature thermal destruction processes.**

- Westinghouse — electric plasma arc
- Ensco — rotary kiln
- Lummus — rotary kiln
- Voltec — other configuration
- Chatwood — other configuration

Four offered **chemical destruction** processes generally applicable **only to low-level PCB contamination in transformer oils.**

- CDC
- Eco Logic
- PPM
- Unison TS

TABLE 1

INFORMATION DRAWN FROM THE CONTRACTOR SUBMISSIONS MADE TO MOE TO DESTROY PCBs AT SMITHVILLE

COMPANY/AFFILIATES	LOCATION	1 MOBILE (9 MTHS)	2 SITED (SPACE)	3 ASKAREL	4 NON-ASKAREL	5 SOILS	6 EQUIP-MENT	7 EXPERTISE IN DECONTA-MINATION	CAPACITY LIQUID KG/HR	CAPACITY PCB CONTA-MINATED SOIL KG/HR	CLEANUP PROJECT DURATION WEEKS
Westinghouse Plasma Systems Canada Inc.	Niagara Falls, Ontario	yes	yes	yes	yes	no	no	NOT GIVEN	600	Future	17
Chemical Decontamination Corporation Aprotec (U.K.)	Birdsboro, PA, U.S.A	yes	NOT GIVEN	no	yes	no	no	NOT GIVEN	NOT GIVEN	Ø	NOT GIVEN
Eco Logic Inc.	Acton, Ontario	under develop-ment	NOT GIVEN	no	yes	yes	no	NOT GIVEN	1,200	1,200	26
Ensco New Energy Canada	Little Rock, AR, U.S.A.	yes	yes	yes	yes	yes	yes	yes	500	1,800	24
Lummus Canada Ltd. Tricil	Toronto	no	yes	yes	yes	yes	yes	yes	1,107	2,022	60
PPM Canada Ltd.	Toronto	yes	yes	no	yes	NOT GIVEN	yes	NOT GIVEN	2,000	Future	24
Unison Transformer Services	Tarrytown, N.J., U.S.A.	NOT GIVEN	NOT GIVEN	no	yes	no	no	NOT GIVEN	NOT GIVEN	NOT GIVEN	NOT GIVEN
Voltec Industries Ltd. Ecolaire ECP	Spruce Grove, Alberta	yes	yes	yes	yes	yes	yes	NOT GIVEN	511	614	40
Chatwood Resources Ltd. Actile Ltd. Merit Resources B.C. Research	Vancouver, B.C.	NOT GIVEN	yes	yes	yes	yes	yes	NOT GIVEN	4,400	NOT GIVEN	NOT GIVEN

NOTES

1. Information shown has not been verified.
2. Numbered columns 1-7 (incl.) refer to responses to seven factors listed in MOE request (refer to page 8 of this report).

TABLE 2
COMPANY AND PROCESS DETAILS PROVIDED IN RESPONSE TO MOE REQUEST

RESPONDER	INCINERATOR	ROTARY KILN	PLASMA ARC	CHEMICAL PROCESS	AS A COMPANY ACTIVE IN		OPERATIONALLY AVAILABLE FOR PCBs	LAB OR PILOT	TEST BURN COMPLETED	NATURE OF CORPORATION		
					CANADA	U.S.				CANADIAN	U.S.	CANADIAN/ U.S.
WESTINGHOUSE			●		●	●	●		●	●		
CDC				●		●	●				●	
ECO LOGIC				●	●			●		●		
ENSCO	●	●			●	●	●		●			●
LUMMUS	●	●			●	●						●
PPM				●	●	●	●					●
UNISON TS				●		●	●				●	
VOLTEC	●				●	●	?	●		●		
CHATWOOD	●				●		?			●		

The ability to take all of the diverse PCB waste materials on the Smithville site is displayed by four proposals:

- **Voltec,**
- **Chatwood,**
- **Ensco,**
- **Lummus,**

The submission by:

- **Westinghouse**
  indicated the ability to deal with liquid PCBs only. Subsequent public presentations have indicated that research and development activities are underway which will permit their process to handle all types of PCB wastes.

The chemical destruction processes by CDC, PPM and Unison TS cannot deal with high-level PCB fluids, nor generally with sludges or contaminated soil.

Destruction capacities are presented by **seven of the respondents,** ranging widely from 500 to 4400 kilograms per hour. **Destruction efficiencies,** where they are mentioned, are **99.9999% or better. Dioxin test results** are mentioned or presented by **five of the respondents.**

Project Factors

Detailed project information is given in the proposals of **six** of the responses. The estimated duration of destruction activities on-site range widely from a low of 17 weeks to a high of 60 weeks. Cost estimates range widely, with lower estimates not dealing with all the diverse wastes on site.

Space requirements, where the project proposals address them, are adequately accommodated. **Utilities requirements** for some of the mobile processes are substantial (e.g. cooling water, electrical power, natural gas, sewer discharge).

Regulatory Requirements

Briefly, responses show an appreciation of the requirements of Ontario Regulation 148/86, and a willingness to proceed with technical demonstrations, and appropriate public hearings related to approvals, although the extent to which these are discussed in the responses varies widely. Two of the proponents, **Westinghouse** and **Ensco,** advise that **test burns have already been carried out.** One of the chemical destruction processes by (PPM) is operational in Canada as well as the US. Three other proposals (Lummus, Voltec and CDC) are based on performance of US installations.

Company Structures

Of the responders, four are Canadian, two USA and three joint Canadian/USA. The responders represent a diverse assortment of old and new companies, large and small, and entrepreneurial and other approaches to the waste management business. It is expected that the stability and resources of the company will become a factor for consideration during the evaluation of the anticipated detailed submissions in the second round of proposals.

General Evaluation Comments:

The following is an assessment on a company by company basis founded upon the submitted material and in some cases the reviewers' prior collective knowledge.

WESTINGHOUSE PLASMA CANADA (WESTINGHOUSE)

This is a joint venture between Westinghouse Canada and Pyrolysis Systems (Canada) Inc. The latter is in itself a joint venture between E.S. Fox Ltd. (Welland) and Dr. Tom Barton (Royal Military College, Kingston).

Westinghouse has extensive experience in the transformer manufacturing and maintenance fields, and recently entered the field of reclassification (retrofitting) of askarel transformers with a patented process known as TRANSFORM.

Pyrolysis Systems have researched and marketed the plasma pyrolysis system for liquid organic wastes. Theoretically the system is capable of resolving any liquid organic molecule into its constituent atoms, radicals etc. Testing with a limited range of organic liquids was recently carried out on the unit purchased by New York State for use at the Love Canal site. A second, larger unit, was recently reputed to have been sold to West Berlin authorities. Preliminary results of the test sequence using 15% PCB liquids appear encouraging and the final report on the test is expected shortly.

There is no evidence at this time of any solid handling capability, although Pyrolysis has on occasion claimed that it was developing one. Neither is there any direct evidence that the principals have either the experience or the ability to handle site decontamination and decommissioning themselves.

CHEMICAL DECONTAMINATION CORP. (CDC)

This is an American (Pennsylvania) commercial enterprise of which very little is known, except that they have recently acquired EPA approval for a mobile PCB decontamination unit capable of handling mineral oils contaminated with PCBs to concentrations as high as 5000 ppm. The specifics of the English technology used are unknown, but presumably are based on use of one or other of the light metals.

Smithville liquid PCBs are generally askarels (26%), and the CHEMDECON process has limited, if any, application there. Furthermore, there is no evidence of site cleanup, decontamination or decommissioning experience.

CHEMDECON did not have access to an askarel/solid handling capability at the time of response.

ECO LOGIC INC. (Eco Logic)

This is a Canadian venture headed by Dr. Douglas Hallett, until recently employed by Environment Canada.

Dr. Hallett is in the process of developing a hazardous waste destruction device, the ELI Super Eliminator, which theoretically has a liquid, sludge and sediment capability. However, it is still believed to be in the conceptual stage of development.

The company has no known expertise or experience in the fields of decontamination or site decommissioning.

ENSCO

The company is operating in Canada through a company known as New Energy (Canada) Inc.

Ensco has extensive experience in destroying PCBs, and has operated an EPA-approved fixed destruction facility at Eldorado, Arkansas, for several years. The company bought the mobile technology developed by the Pyromagnetics Corporation (Boston), and has a mobile unit which is presently EPA-approved for liquids. Another larger unit is awaiting approval for both solids and liquids.

It is not known precisely what experience the company has in site decontamination and decommissioning although there was reported evidence that Ensco is acquiring such expertise through a joint venture or some other arrangement.

LUMMUS CANADA INC. (Lummus)

This company, through its American parent, Combustion Engineering Inc., has extensive experience in the field of hazardous waste disposal. Lummus would employ Combustion Engineering's rotary kiln technology which has been used extensively in this field.

In handling the work at Smithville, Lummus proposes to build a rotary kiln to be operated by Tricil. There may be sufficient data available, based upon the group's past experience with this technology, to minimize the testing needed. However, such data would have to be made available and be more carefully assessed before a final opinion can be offered.

The company appears to have both expertise and experience in the areas of site cleanup and decommissioning.

UNISON TRANSFORMER SERVICES INC. (Unison TS)

The company, a subsidiary of Union Carbide Corporation, is primarily involved in the retrofilling and re-classification to non-PCB status of PCB contaminated transformers. The company has no direct access to any processes for disposing of bulk askarel liquids or treating contaminated soil.

It is not known whether or not this company has experience in clean-up and decommissioning.

PPM CANADA INC. (PPM)

This American owned company is seeking to establish itself in Canada to treat PCB-contaminated mineral oil. Although it has already operated in several provinces (primarily Saskatchewan), the company is seeking approval to operate in Ontario and approval is expected to be forthcoming shortly.

The submission did not quote on treating askarels, and there is little, if any, PCB contaminated mineral oil in Smithville.

PPM, a subsidiary of USPCI Inc., has access to USPCI's proposed process for treating PCB contaminated soil which was scheduled for commercialization in 1986. No details of the process are available.

VOLTEC INDUSTRIES LTD. (Voltec)

The Voltec proposal is based on the two-stage, controlled-air technology developed by Ecolaire Ecp. The proposed incineration system has been previously employed to dispose of municipal solid and bio-medical (pathological) waste. There is no evidence that the company has any experience or expertise in site clean-up and decommissioning.

CHATWOOD RESOURCES LTD. (Chatwood)

This is a Canadian venture based in British Columbia. The company claims to have two processes, one of which is an oxygen-blown vertical kiln capable of handling drummed liquids and solids. The other is an undisclosed batch process for treating low concentration PCB organic liquids. The company is seeking funding for the construction of operational units in both cases.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

- Proposals indicating a **probable or possible capability** to carry out the defined objectives, accommodating the destruction of **full** scope of PCB wastes existing on the Smithville site were received from **five respondents.**

  - **Ensco** - **Lummus**
  - **Voltec** - **Chatwood**
  - **Westinghouse**

- Proposals indicating a capability to deal with **part** of the PCB wastes existing on the Smithville site were received from **three proponents.**

  - **PPM** - **Eco Logic**
  - **CDC**

- Proposals judged **deficient** because the **technology is not yet proven** by existing commercial installation or by advanced demonstration units were:

  - **Eco Logic** - **Unison TS**

CONCLUSIONS

One proposal - **by Ensco** - indicates existing technology available on existing equipment which may be capable of dealing with all types of PCB waste listed in the MOE request as being present at Smithville.

Three proponents - **Lummus, Voltec** and **Chatwood** - appear to have the appropriate technology, in varying degrees of readiness, to do all of the job, but lack existing mobile equipment.

The fifth proponent - **Westinghouse** - has constructed mobile equipment, but its capability to deal with solids or high strength liquids is not clearly described in the proposal.

The balance of the proponents have to be seen as not responsive to the MOE requirement to deal with all of the waste, although several appear to have proven or near proven technologies available (or nearly available) to do part of the work.

RECOMMENDATIONS

In light of the precise nature of the description in the MOE request for the work to be accomplished, and having regard for the size of the CWML property, and, lastly, the need to get on with the job quickly without multi-company confusion that would arise if MOE opted for a solution asking two or more unrelated companies do the work, we recommend as follows:

1. Invitations should be extended to meet with an MOE, P&R/et al team to the five companies noted as having, or possibly having, capabilities to undertake the PCB destruction project -including decommissioning of the site -namely **Ensco, Lummus, Voltec, Chatwood** and **Westinghouse.**

2. Discussions should be held with these five companies, dealing with their recent proposals and further supporting information.

   The interview team would work to an established schedule of criteria and questions. The most critical of these are the ability of the proponent to deal with all wastes present at Smithville in a timely way, with a strong likelihood of obtaining approval (under the regulatory requirements) quickly.

3. Prepare a list of at least two prequalified proponents from an assessment of the data provided.

4. Develop a detailed proposal which would include:

   - details of technology - including supporting test burn or other performance data
   - suitable general action plan
   - payment basis and schedule
   - facilities required
   - activity descriptions, sequence and timing
   - mobilization costs
   - site staff complement
   - subcontractors required
   - occupational health and safety training
   - organizational structure
   - current financial information
   - corporate experience
   - references

5. Request detailed response from each proponent shortlisted in (3).

6. Assess the responses

7. Select one contractor on the basis of:

   a) capability to carry out the project
   b) cost information provided
   c) an interview
   d) a preliminary agreement on the general nature and terms of a possible contract.

8. Develop a detailed agreement covering all contractual matters, assurances, warranties, obligation of the contractor and MOE.

9. Recommend the contractor and present the agreement to the Minister for execution.

APPENDIX "A"

SUMMARY OF WASTE INVENTORY

SUMMARY OF WASTE INVENTORY - CWML SITE

CATEGORY		ESTIMATED COUNT
Transformers	large	81
	small	114
Magnets		8
Capacitors	large	3
	small	46
Other Equipment	large	8
	small	19
Wood and Trash		111
Miscellaneous Metal		78
Drums	PCB solids	506
	PCB liquid	12
	PCB sludge	326
	Recovery	25
	PCB empty	342
	new	133
	non-PCB	75
	cleanup solids	150
Cleanup Solvent		150
Storage Tanks		2
Truck Tanks		6
Buildings and Structures		5
	Concrete	------
TOTAL ESTIMATED COUNT		**2,200**

APPENDIX "B"

DISPOSAL COMPANIES

PCB

DISPOSAL COMPANIES - IN UNITED STATES

86628

COMPANY	ADDRESS	PHONE
Incinerator		
ENSCO	P.O. Box 1975 Eldorado, AK 71730	501-863-7173
Rollins	P.O. Box 609 Deer Park, TX 77536	713-479-6001
EPA Mobile Incinerator	Woodbridge Avenue Rariton Depot, Bldg 10 Edison, NJ 08837	201-321-6635
Pyrotech Systems	P. O. Box 1653 Tullahoma, TN 37388	615-455-9954
General Electric	100 Woodlawn Avenue Pittsfield, MA 01201	413-494-3729
SCA Chemical Services	1000 East 111th Street 10th Floor Chicago, IL 60628	312-660-7200
Chemical		
Acurex	485 Clyde Avenue Mountain View, CA 94042	415-964-3200
Chemical Decontamination Corporation	5 Riga Lane Baltic Mews Industrial Park Birdsboro, PA 19508	215-582-2766
Exceltech, Inc.	42475A Osgood Road Fremont, CA 94539	415-659-0404
General Electric	1040 East Erie Avenue Philadelphia, PA 19214	215-289-0400
General Electric	1 River Road Schenectady, NY 12345	518-385-3134
PCB Destruction	304 N. Baltimore Kansas City, MO 64116	816-474-1661
PPM	1875 Forge Street Tucker, GA 30084	913-648-0448
Rose Chemical	2459 Charlotte Street Kansas City, MO 64108	816-471-7227
Sunohio, Inc.	1700 Gateway Blvd S.E. Canton, OH 44707	216-452-0837

Received from EPA - Feb. 7/86

Transformer Consultants	P. O. Box 3575 Akron, OH 44310	216-929-2847

Solvent Extraction

Quadrex HPS, Inc.	1940 N.W. 67th Place Gainesville, Florida 32601	904-373-6066

Capacitor Disposal

Environmental International	912 Scott Kansas City, KS 66105	800-255-0514

Landfills

Chemical Waste Mgmt	Alabama Inc. Box 55 Emelle, AL 35459	205-652-9531
Casmalia Resources	Casma NTU Road, Box E Casmalia, CA 93429	805-937-8449
Chemical Waste Mgmt	Box 157 Kettleman City, CA 93239	209-386-9711
Envirosafe Services, Inc. of Idaho	Box 936 Mt. Home, ID 83647	208-587-8434
U. S. Ecology, Inc.	Box 578 Beatty, NV 89003	702-553-2203
CECOS International	56th St. & Niagara Falls Boulevard Niagara Falls, NY 14302	716-282-2676
SCA Chemical Services	Box 200 Model City, NY 14107	716-754-8231
CECOS International	5092 Aber Road Williamsburg, OH 45176	513-720-6114
Chem-Security Systems Incorporated	Star Route Arlington, OR 98712	503-454-2777

APPENDIX "C"

SITE CLEANUP CRITERIA

SITE CLEAN UP CRITERIA

Relative to Soil, Air, Water and Equipment .....

The following criteria, with their rationale, have been assembled from various sources for use as a Project Standard to guide the planning and the site activity involved in securing and decontaminating the site.

PCB Waste

Ontario Regulation 11/82[(2)*] defines PCB waste as any PCB liquid, PCB equipment, or PCB material containing more than 50 ppm PCB. PCB waste is included in the definition of hazardous waste under Regulation 309 of the Environmental Protection Act.[(2)*]

Soil

..... 20 ppm To Be Used As Maximum Level

Solids containing 50 ppm or greater PCB are defined as PCB waste by Regulation 11/82. Soils containing less than 50 ppm PCB could be hazardous (leachate toxic) by definition in O.Reg.309.

The current thinking is that an acceptance/rejection threshold lower than 50 ppm will be used, to deal with the non-homogeneous physical characteristics of soils, their variable organic and mineral composition, and the statistical uncertainties of sampling soil under field conditions. There are also statistical uncertainties involved in the chemical analysis of PCBs, deriving from the complexity of the sample workup technique, the fact that we are

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* References for this section are listed on page 9.

usually dealing with mixtures of PCBs rather than a single grade, and from the effects of other chlorinated material (including degradation products from PCBs) in the soil sample. The acceptance/rejection level to be used is 20 ppm.

An assumed value for the standard deviation for PCB in contaminated soils of 15 ppm is reasonable, in the absence of measured data. With this, the ratio σ/μ of the standard deviation to the mean is 0.3, and the confidence limit of achieving 50 ppm cutoff within two standard deviations is 97.5 percent (one tail of a normal distribution).

AIR

PCB Laden Vapours .....

Emission of PCB vapour from operations must not exceed criteria as follows:[4]

1/2 hour average	450 ng/m^3	point of impingement, escalated maximum concentration
24 hour average	150 ng/m^3	ambient air criteria
annual average	35 ng/m^3	ambient air criteria

These standards were developed from a risk assessment which showed them associated with a risk of 0.84 excess deaths per million population per year. In perspective, death from all causes are 130,000 (per million) each year.

Worker exposure is governed by the Ontario Occupational Heath & Safety Act[5], with guidelines which include a time-weighted average exposure criterion (TWAEC) for PCB of 50 ug/m^3.

The TWAEC is based on cumulative exposure during a 40 hour work week, and is based on cumulative weekly exposure divided by 40.

The American Conference of Government and Industrial Hygienists (ACGIH) have developed additional criteria for PCBs which have been utilized by the Ontario Ministry of Labour in the absence of specific Ontario regulations.

	PCB 1142	PCB 1156	
TLV - TWA	1	0.5	mg/m^3
TVL - STEL	2	1	

The threshold limit value, time-weighted average (TLV-TWA) is based on an 8 hour working day and a 40 hour week. The threshold limit value, short term exposure limit (TLV-STEL) is the level which must not be exceeded for more than 15 minutes or for more than 4 such periods each day.

The Ministry of Labour has published notice of its consideration toward making PCBs a "Designated Substance". Evaluation of responses to their invitation to comment on October 12, 1985 are now underway. It is expected that a decision regarding designation will not be made during 1986. Based on comments received, any constraints resulting are expected to relate to procedural matters, not to exposure limits.

WATER

Allowable Limit 1 ug/L PCB .....

Water released from filtration cleanup systems will meet the Interim Maximum Allowable Limit of 1 ug/L for water sent to the wastewater treatment plant, provided that the plant can achieve, at the flow rate involved, an effluent quality of 0.001 ug/L in the receiving water after mixing.[3]

Solid Equipment

250 ug/m^2 Proposed Limit .....

No regulated level for cleanup of solid surfaces exists in Ontario. A relevant guideline of 25 ug/m^2 of surface was developed in the US for use in cleanup of an office building after a PCB fire[6].

This is for exposed surfaces in a public building which will be occupied during working hours. It is reasonable to accept a higher threshold for industrial equipment in use, and for equipment and containers being salvaged for disposal or destruction. A proposed working level is:

250 ug/m^2 of surface

The 250 ug/m^3 criterion is subjective, and may be put in context as follows, using an approach suggested by Ontario Hydro:

- Assume with appropriate protective equipment that the likely avenue of exposure is inadvertent ingestion.

- Assume oral intake of the total amount of PCB on a contaminated glove on one hand, ca 150 cm^2

- At 250 ug/m^2 contamination level (assuming complete pickup from a contaminated surface), ingestion of 250 x 150 x 10^{-4} or 3.75 ug will result.

- Normal dietary uptake of PCBs (from fish) is reported to be ca.200 ug per serving[9]

- The postulated ingestion is 2% of the dietary uptake, exposure for exposure.

The US criterion was based on a maximum daily intake of 2 pg/kg of body weight of dioxins, which are generated in a PCB fire in a ratio of about 1:1000 to PCBs. The PCBs in the Smithville site are not residues from a fire.

The Ontario Ministry of Labour guideline regarding workplace contamination considers a surface content of greater than 1,000 ug/100 cm^2 (100,000 ug/m^2) as "dirty", but does not define a "clean" surface.

Summary of Criteria for Cleanup of PCB Waste

Liquids		50 ppm
Soil	no greater than	20 ppm*
	with secondary protection against runoff and leaching if greater than	1 ppm
Air Emissions		
	GLC (1/2 hour average)	450 ng/m^3
	Ambient air criterion (24 hour average)	150 ng/m^3
	Ambient air criterion (annual average)	35 ng/m^3
Workspace Air		
	TWAEC	50 ug/m^3
	TLV - TWA	1 mg/m^3
	TLV - STEL	2 mg/m^3
Water	MOE Guideline Origin and Management of PCB Waste	5 ug/L
Equipment and Containers		
	surface residual no greater than	250 ug/m^2

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* and not "leachate" toxic

PCB STANDARDS AND GUIDELINES

	ug/g or mg/l or ppm	ug/l or ppb
Fresh water for protection of marine **aquatic life** (US EPA)	0.000,001	0.001
Interim **drinking water** standard (MOE)	0.003	3
Influent to **wastewater treatment** system (MOE)	0.005*	5*
Dredged spoils (MOE)	0.05	50
Solubility in Water		
Aroclor 1254	0.04	40
Aroclor 1242	0.2	200
Road oiling and land spraying (MOE)	5	5,000
Landfill (MOE)	50	50,000**
Designated PCB waste (MOE)	50	50,000

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* These are maximums - depending on dilution in the plant, which may vary.

** Depending upon leachate testing.

References - Related to site cleanup criteria.

1. Environmental Protection Act, RSO 1980 Ch 141 and Regulation 309 RRO 1980 as amended to Ontario Reg.322/85, June 17, 1985

2. Ontario Regulation 11/82 under the Environmental Protection Act. Jan. 15, 1986

3. Water Management Goals, Policies, Objectives and Implementation Procedures, Ontario Ministry of the Environment. Nov. 1978

4. List of Tentative Standards, Guidelines and Provincial Guidelines for Air Contaminants, Ontario Ministry of the Environment. Jan. 1983

5. Occupational Health and Safety Act, RSO 1980

6. Kim, N.K. and J. Hawley, Document 0549P, Bureau of Toxic Substance Assessment, Division of Health Risk Control, New York State Department of Health, 1984

7. Revised Proposals for the Regulation of Mobile PCB Destruction Facilities Ontario Ministry of the Environment, May 1984

8. The Ontario Gazette: 4184 Notice of Possible Designation of Polychlorinated Biphenyls (PCBs), October 12, 1985

9. Day, J.J., M.D., PCB Disposal: A Medical Position, Ontario Medical Review, June 1979, pp. 285-287

APPENDIX "D"

PHOTOGRAPHS

- AUGUST, 1984, AIR PHOTO SANEXEN SITE, CLEANUP SITE OPERATIONS - 1/3RD COMPLETED.

- EQUIPMENT REORGANIZATION FOR CLEANING

- TRUCK CLEANING PAD IN OPERATION

- COVER PAGE FOR PRE-DESIGN CONSIDERATIONS REPORT


SANEXEN
TRECO
DELCO

ONTARIO MINISTRY OF THE ENVIRONMENT

PRE-DESIGN CONSIDERATIONS

CHEMICAL WASTE MANAGEMENT LIMITED SITE

TOWNSHIP OF WEST LINCOLN

THE PROCTOR & REDFERN GROUP

May 1986

Cover Page for Pre-Design Considerations Report